



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/614,345	07/08/2003	Masaaki Kurihara	DAIN:740	7853
25944	7590	09/08/2005	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			RUGGLES, JOHN S	
			ART UNIT	PAPER NUMBER
			1756	

DATE MAILED: 09/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/614,345

Applicant(s)

KURIHARA ET AL.

Examiner

John Ruggles

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 13 and 14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION*****Election/Restrictions***

Applicants' election with traverse of Group I (instant claims 1-12) on 6/2/05 is acknowledged. The traversal is on the ground(s) that: (1) the search of Group I would encompass a search of Group II without serious burden on the Examiner and (2) if the Group I phase masks (claims 1-6) are ever allowed, the Group II methods of using a phase mask (claims 13-14) would then have to be rejoined based on MPEP § 821.04.

However, this is not found persuasive for at least the following reasons. (1) Contrary to Applicants' assertion, the search required for instant claims 1-12 (Group I) in class 430, subclass 5 does **not** include that for instant claims 13-14 (Group II) in class 430, subclass 321 (as previously pointed out). (2) MPEP § 821.04 states, in part, "...*if* applicant elects claims directed to the product, and a product claim is subsequently found allowable, withdrawn process claims which depend from or otherwise include all the limitations of the allowable product claim will be rejoined..." (emphasis added). However, no product claims have yet been found allowable and the non-elected Group II process claims do not depend from the elected Group I product claims. Therefore, Applicants must specifically show why they believe one or more product phase mask claims to be allowable (e.g., over the cited prior art, etc.) *and* must either amend the Group II process claims to depend therefrom or specifically show why they believe that these Group II process claims include **all** the limitations of one or more allowable product claims. (3) In addition, the criteria and reasons for the instant restriction between Group I and Group II set forth in the previous Office action mailed on 5/2/05 are still valid. The basis for that restriction is still supported, because (i) the inventions of Groups I and II are distinct from each other in

Art Unit: 1756

accordance with MPEP § 806.05(h) for the reasons previously set forth and (ii) these distinct inventions have acquired a separate status in the art as shown by their different classification as well as their recognized divergent subject matter (both of which were previously indicated and neither of which has been specifically disputed by Applicants). (4) Examination of these distinct inventions together would place serious additional burden on the USPTO Examiner for conducting the diverse searches that would be required for each of these distinct inventions (MPEP § 808.02).

Furthermore, MPEP § 803 states, in part, “a serious burden on the examiner may be *prima facie* shown if the examiner shows by appropriate explanation of separate classification, or separate status in the art, or a different field of search as defined in MPEP § 808.02”. The distinct inventions of Groups I and II have been previously shown to be separately classified, so Applicants’ request to withdraw the previous restriction requirement would place a serious burden on the Examiner. Therefore, the restriction requirement is still deemed proper and is now made FINAL.

Claims 13-14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention.

### ***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because: (i) reference characters "22" and "2" have both been used at page 10 line 20 through page 11 line 8 (note the use of the reference character "2" at page 11 line 8) to designate the optical fiber in Figure 5A and (ii) reference characters "230" and "220" have both been used at page 16 lines 7-

Art Unit: 1756

17 (note the use of the reference character "220" at page 16 line 17) to designate the resist film in Figures 4D-4E.

The drawings are also objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: (i) exposure "P<sub>1</sub>" is described at page 13 line 26, but is not shown in Figure 2D, to which this passage refers and (ii) the center position "B0" (from which distances L1 and L2 are drawn in Figures 4C and 4F, respectively) is described (e.g., at page 16 lines 4-5, etc.), but is not shown in Figures 4A-4H (to which this passage refers).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are further objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: exposure doses "D1", "D2", and "D3" are shown in Figure 2D, but they are not mentioned in the corresponding description of this figure at page 13 lines 24-30.

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR

Art Unit: 1756

1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Specification*

35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms, which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are: (1) at page 1 lines 21-22, "the period of diffraction grating and the magnitude of refractive-index modulation to use" should be changed (e.g., to --the period of the diffraction grating and the magnitude of a refractive-index modulation in order to use--, etc.); (2) at page 2 line 5, "takes much time and a low yield" should be changed (e.g., to --takes too much time and results in a low yield--, etc.); and (3) at page 2 lines 33-34, "become deemed to be attractive" should be simplified to --become ~~deemed to be~~ attractive--. Note that due to the number of errors, those listed here are merely examples of the corrections needed and do not represent an exhaustive list thereof.

Art Unit: 1756

Appropriate correction is required. An amendment filed making all appropriate corrections must be accompanied by a statement that the amendment contains no new matter and also by a brief description specifically pointing out which portion of the original specification provides support for each of these corrections.

### ***Claim Objections***

Applicant is advised that should claim 8 be found allowable, claim 9 (as interpreted below) will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). In this case, both claims 8 and 9 specify the same limitation of multiple photolithographic exposures.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1-3, 7, and 9, the exact meaning of “apodization exposure” is unclear. Page 3 lines 22-23 of the specification state, in part, “the irradiation method...through a phase mask to form a diffraction grating...needs to carry out apodization to modulate the refractive index of the

Art Unit: 1756

optical fiber axially”. For the purpose of this Office action and in order to advance the prosecution of this application, the above statement from the specification is understood to suggest that “apodization exposure” was *intended to* --modulate or change the refractive index by selective exposure through a phase mask having a plurality of grooves-- (e.g., to form a diffraction grating in an optical fiber or optical waveguide, etc.). Nevertheless, Applicants are apprised that recitations directed to the manner in which the phase mask is intended to be used do not distinguish the instant claims to a phase mask or methods of fabricating phase masks from those of the prior art (otherwise having the same actual structural phase mask limitations or the same positively recited steps of fabricating phase masks), when the prior art has the capability to so perform. See MPEP § 2114 and *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Furthermore, “the recitation of a new intended use for an old product does not make a claim to that old product patentable”, *In re Schreiber*, 44 USPQ2d 1429 (Fed. Cir. 1997). Claims 4-6 depend on claim 1 and claims 8 and 10-12 depend on claim 7.

In claim 9 lines 15-19, it is unclear what happens to “the number of times of the photolithographic process *in order to* adjust the respective depths of the grooves” (emphasis added) in the phase mask being fabricated. Is the number of photolithographic process cycles increased, decreased, controlled, determined, or changed in some other way “in order to adjust the respective depths of grooves” in the phase mask? For the purpose of this Office action, the above phrase has been interpreted to mean --the number of times of the photolithographic process is changed in order to adjust the respective depths of the grooves--.



***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-12 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Segawa et al. (US Patent 6,214,495) .

Segawa et al. teach a phase mask (phase shift mask, PSM) for patterning an optical fiber and a method of manufacturing the phase mask (PSM, title, abstract). Figure 2(b) shows the phase mask 21 having a surface of alternating grooves 26 and strips 27 for making a Bragg diffraction grating in an optical fiber (col. 4 lines 53-55, which also reads on an optical waveguide and an optical guide, instant claims 5, 6, 11, and 12). The phase mask (PSM) parallel groove pitch is varied in the range of 0.85-1.25  $\mu\text{m}$  (col. 3 lines 25-26 and col. 4 lines 1-3, which encompasses the instant pitch of 1.06  $\mu\text{m}$ ) by linear or non-linear increase(s) or decrease(s) in pitch between grooves, depending on the position of each groove 26 (either perpendicular to or in the direction of the groove 26) on the PSM (col. 6 lines 45-50, which reads on the instant

Art Unit: 1756

plurality of grooves having a duty ratio adjusted according to the positions of the grooves by adjusting the respective widths of the grooves, instant claims 1 and 2). The method of manufacturing the phase mask (PSM) is shown in Figures 6(a)-6(h), which are very similar to instant Figures 2A-2I, and includes forming a chromium (Cr) film on a quartz substrate, patterning a resist on the Cr by multiple exposures with electron beams (instant claims 8, 9 and 10), dry etching the Cr through the resist pattern using a  $\text{CH}_2\text{Cl}_2$  gas, then etching the quartz substrate through the resist and Cr patterns to an exact depth in the range of 200-400 nm by controlling etching time using a  $\text{CF}_4$  gas, and removing the remaining resist and Cr (col. 7 line 44 to col. 8 line 37, which reads on the instant groove depth of 250 nm and the instant PSM groove duty ratio adjusted according to positions of the grooves by adjusting the respective depths of the grooves, instant claims 3 and 7). This phase mask (PSM) has the same structural limitations as instantly claimed and the method of manufacturing it has the same steps as instantly claimed. Therefore, the phase mask (PSM) and method of making it taught by Segawa et al. are inherently capable of being used for patterning a diffraction grating in an optical guide, optical waveguide, or optical fiber having a discontinuously changing period (instant claim 4).

Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al. (EP-936505 A1) in view of Maisenhoelder et al. (US Patent Application Publication 2002/0076154).

Kurihara et al. teach a method of making a phase mask (phase shift mask, PSM) for patterning a Bragg diffraction grating in an optical fiber (title, which also reads on an optical waveguide or an optical guide, instant claims 5, 6, 11, and 12). The phase mask (PSM) parallel

Art Unit: 1756

groove pitch is usually in the range of 0.85-1.25  $\mu\text{m}$  ([0017], which encompasses the instant pitch of 1.06  $\mu\text{m}$ ). The method of manufacturing the phase mask (PSM) is shown in Figures 4(a)-4(h), which are very similar to instant Figures 2A-2I, and includes forming a chromium (Cr) film on a quartz substrate, patterning a resist on the Cr by multiple exposures with electron beams or alternatively with laser light ([0016, 0037], instant claim 10), dry etching the Cr through the resist pattern using a  $\text{CH}_2\text{Cl}_2$  gas, then etching the quartz substrate through the resist and Cr patterns to a depth in the range of 200-400 nm by specifically controlling etching time using a  $\text{CF}_4$  gas, and removing the remaining resist and Cr ([0027-0034], which reads on the instant groove depth of 250 nm).

While teaching a phase mask (PSM) having very similar structural limitations and a method of manufacturing a phase mask (PSM) having very similar steps as instantly claimed, Kurihara et al. do not specifically teach a duty ratio of the grooves that is adjusted according to the positions of the grooves (instant claims 1, 7, 8, and 9) [1] by adjusting either the respective widths (instant claim 2) [2] or the respective depths of the grooves (instant claim 3) [3]; in which the PSM is *intended for* forming a diffraction grating having a discontinuously changing period (instant claim 4) [4].

Maisenhoelder et al. teach a waveguide plate and a process for making the waveguide plate (title, abstract). The waveguide plate is made by patterning through a phase mask (phase shift mask, PSM) 14 made by forming a diffraction grating having parallel grooves in a quartz substrate 15, as shown by Figures 7a-7g. The process of making the PSM diffraction grating includes etching the quartz substrate 15 through a resist pattern 16, removing remaining resist to form a diffraction grating pattern of parallel grooves in the PSM substrate 15, covering with

Art Unit: 1756

chromium (Cr) 17, etching Cr 17 through a second resist 18 patterned by electron or laser beams, and removing the residual second resist 18 to complete the phase mask (PSM) 14 [0148-0149]).

A waveguide coupler 23 (shown in Figure 10) having a coupling grating 3 (shown in Figures 8a and 8b) with a constant grating period [0157-0158] is made by a phase mask (PSM) having an appropriately (e.g., linearly, etc.) varying grating pattern (e.g., of parallel grooves, etc.) [0164]. The transmissivity of the coupler 23 is a sensitive function of the wavelength and the grating period, which vary depending on position [0166]. The phase mask (PSM) grating pattern is adjusted by changing the groove-to-land ratio (reading on the instantly defined “duty ratio”) and the grating or groove depth, which are both readily calculated with the aid of known programs [0172].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the phase mask (PSM) and the method of manufacturing a phase mask (PSM) for patterning a diffraction grating in an optical fiber (or an optical waveguide or an optical guide) taught by Kurihara et al. by changing the phase mask (PSM) groove-to-land ratio (or duty ratio of the grooves) according to the positions of the grooves [1] by adjusting either the respective widths [2] or the respective depths of the grooves [3]; in which the PSM is *intended for* forming a diffraction grating having a discontinuously changing period [4]. This is because Maisenhoelder et al. teach that a phase mask (PSM) grating pattern (*intended for* forming a waveguide plate or diffraction grating) was known at the time of the invention to be readily adjusted by changing the groove-to-land ratio (reading on the instantly defined “duty ratio” of the grooves) and the grating or groove depth of the phase mask (PSM) grating pattern. Since Maisenhoelder et al. teach that a waveguide with a constant grating period is made by patterning

Art Unit: 1756

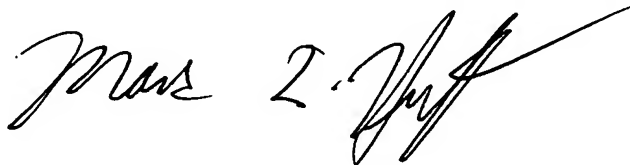
through a phase mask (PSM) having a linearly varying grating pattern, one of ordinary skill in the art would expect a waveguide or diffraction grating having a discontinuously changing period to be obtained by patterning through an appropriately structured phase mask (PSM) (e.g., having a non-linearly varying grating pattern of parallel grooves, etc.).

### *Conclusion*

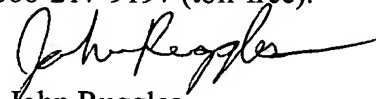
Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Ruggles whose telephone number is 571-272-1390. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



MARK F. HUFF  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700



John Ruggles  
Examiner  
Art Unit 1756